Network Working Group   Internet Activities Board
Request for Comments: 1200   J. Postel, Editor
Obsoletes: RFCs 1140,   April 1991
1100, 1083, 1130

IAB OFFICIAL PROTOCOL STANDARDS

Status of this Memo

This memo describes the state of standardization of protocols used in the Internet as determined by the Internet Activities Board (IAB). Distribution of this memo is unlimited.

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Introduction

Discussion of the standardization process and the RFC document series is presented first, followed by an explanation of the terms. Sections 6.2 - 6.8 contain the lists of protocols in each stage of standardization. Finally come pointers to references and contacts for further information.

This memo is intended to be issued quarterly; please be sure the copy you are reading is current. Current copies may be obtained from the Network Information Center or from the Internet Assigned Numbers Authority (see the contact information at the end of this memo). Do not use this edition after 30-Jun-91.

See Section 6.1 for a description of recent changes. In the official lists in sections 6.2 - 6.8, an asterisk (*) next to a protocol denotes that it is new to this document or has been moved from one protocol level to another.

1. The Standardization Process

The Internet Activities Board maintains this list of documents that define standards for the Internet protocol suite (see RFC-1160 for an explanation of the role and organization of the IAB and its subsidiary groups, the Internet Engineering Task Force (IETF) and the Internet Research Task Force (IRTF)). The IAB provides these standards with the goal of co-ordinating the evolution of the Internet protocols; this co-ordination has become quite important as the Internet protocols are increasingly in general commercial use.

The majority of Internet protocol development and standardization activity takes place in the working groups of the Internet Engineering Task Force.

Protocols which are to become standards in the Internet go through a series of states (proposed standard, draft standard, and standard) involving increasing amounts of scrutiny and experimental testing. At each step, the Internet Engineering Steering Group (IESG) of the IETF must make a recommendation for advancement of the protocol and the IAB must ratify it. If a recommendation is not ratified, the protocol is remanded to the IETF for further work.

To allow time for the Internet community to consider and react to standardization proposals, the IAB imposes a minimum delay of 4 months before a proposed standard can be advanced to a draft standard and 6 months before a draft standard can be promoted to standard.

It is general IAB practice that no proposed standard can be promoted to draft standard without at least two independent implementations (and the recommendation of the IESG). Promotion from draft standard to standard generally requires operational experience and demonstrated interoperability of two or more implementations (and the recommendation of the IESG).

In cases where there is uncertainty as to the proper decision concerning a protocol the IAB may convene a special review committee consisting of experts from the IETF, IRTF and the IAB with the purpose of recommending an explicit action to the IAB.

Advancement of a protocol to proposed standard is an important step since it marks a protocol as a candidate for eventual standardization (it puts the protocol "on the standards track"). Advancement to draft standard is a major step which warns the community that, unless major objections are raised or flaws are discovered, the protocol is likely to be advanced to standard in six months.

Some protocols have been superseded by better ones or are otherwise unused. Such protocols are still documented in this memorandum with the designation "historic".

Because the IAB believes it is useful to document the results of early protocol research and development work, some of the RFCs document protocols which are still in an experimental condition. The protocols are designated "experimental" in this memorandum. They appear in this report as a convenience to the community and not as evidence of their standardization.

Other protocols, such as those developed by other standards organizations, or by particular vendors, may be of interest or may be recommended for use in the Internet. The specifications of such protocols may be published as RFCs for the convenience of the Internet community. These protocols are labeled "informational" in this memorandum.

In addition to the working groups of the IETF, protocol development and experimentation may take place as a result of the work of the research groups of the Internet Research Task Force, or the work of other individuals interested in Internet protocol development. The IAB encourages the documentation of such experimental work in the RFC series, but none of this work is considered to be on the track for standardization until the IESG has made a recommendation to advance the protocol to the proposed standard state, and the IAB has approved this step.

A few protocols have achieved widespread implementation without the approval of the IESG and the IAB. For example, some vendor protocols have become very important to the Internet community even though they have not been recommended by the IESG or ratified by the IAB. However, the IAB strongly recommends that the IAB standards process be used in the evolution of the protocol suite to maximize interoperability (and to prevent incompatible protocol requirements from arising). The IAB reserves the use of the terms "standard", "draft standard", and "proposed standard" in any RFC or other publication of Internet protocols to only those protocols which the IAB has approved.

In addition to a state (like "Proposed Standard"), a protocol is also assigned a status, or requirement level, in this document. The possible requirement levels ("Required", "Recommended", "Elective", "Limited Use", and "Not Recommended") are defined in Section 4.2. When a protocol is on the standards track, that is in the proposed standard, draft standard, or standard state (see Section 5), the status shown in Section 6 is the current status. For a proposed or draft standard, however, the IAB will also endeavor to indicate the eventual status this protocol will have after adoption as a standard.

Few protocols are required to be implemented in all systems; this is because there is such a variety of possible systems, for example, gateways, terminal servers, workstations, and multi-user hosts. The requirement level shown in this document is only a one word label, which may not be sufficient to characterize the implementation requirements for a protocol in all situations. For some protocols, this document contains an additional status paragraph. In addition, more detailed status information is contained in separate requirements documents (see Section 3).

2. The Request for Comments Documents

The documents called Request for Comments (or RFCs) are the working notes of the "Network Working Group", that is the Internet research and development community. A document in this series may be on essentially any topic related to computer communication, and may be anything from a meeting report to the specification of a standard.

Notice:

> All standards are published as RFCs, but not all RFCs specify standards.

Anyone can submit a document for publication as an RFC. Submissions must be made via electronic mail to the RFC Editor (see the contact information at the end of this memo).

While RFCs are not refereed publications, they do receive technical review from the task forces, individual technical experts, or the RFC Editor, as appropriate.

The RFC series comprises a wide range of documents, ranging from informational documents of general interests to specifications of standard Internet protocols. In cases where submission is intended to document a proposed standard, draft standard, or standard protocol, the RFC Editor will publish the document only with the approval of both the IESG and the IAB. For documents describing experimental work, the RFC Editor will notify the IESG before publication, allowing for the possibility of review by the relevant IETF working group or IRTF research group and provide those comments to the author. See Section 5.1 for more detail.

Once a document is assigned an RFC number and published, that RFC is never revised or re-issued with the same number. There is never a question of having the most recent version of a particular RFC. However, a protocol (such as File Transfer Protocol (FTP)) may be improved and re-documented many times in several different RFCs. It is important to verify that you have the most recent RFC on a particular protocol. This "IAB Official Protocol Standards" memo is the reference for determining the correct RFC for the current specification of each protocol.

The RFCs are available from the Network Information Center at SRI International, and a number of other sites. For more information about obtaining RFCs, see Sections 7.4 and 7.5.

3. Other Reference Documents

There are four other reference documents of interest in checking the current status of protocol specifications and standardization. These are the Assigned Numbers, the Annotated Internet Protocols, the Gateway Requirements, and the Host Requirements. Note that these documents are revised and updated at different times; in case of differences between these documents, the most recent must prevail.

Also, one should be aware of the MIL-STD publications on IP, TCP, Telnet, FTP, and SMTP. These are described in Section 3.5.

3.1. Assigned Numbers

This document lists the assigned values of the parameters used in the various protocols. For example, IP protocol codes, TCP port numbers, Telnet Option Codes, ARP hardware types, and Terminal Type names. Assigned Numbers was most recently issued as RFC-1060.

Another document, Internet Numbers, lists the assigned IP network numbers, and the autonomous system numbers. Internet Numbers was most recently issued as RFC-1166.

3.2. Annotated Internet Protocols

This document lists the protocols and describes any known problems and ongoing experiments. This document was most recently issued as RFC-1011.

3.3. Gateway Requirements

This document reviews the specifications that apply to gateways and supplies guidance and clarification for any ambiguities. Gateway Requirements is RFC-1009. A working group of the IETF is actively preparing a revision.

3.4. Host Requirements

This pair of documents reviews and updates the specifications that apply to hosts, and it supplies guidance and clarification for any ambiguities. Host Requirements was issued as RFC-1122 and RFC-1123.

3.5. The MIL-STD Documents

The Internet community specifications for IP (RFC-791) and TCP (RFC-793) and the DoD MIL-STD specifications are intended to describe exactly the same protocols. Any difference in the protocols specified by these sets of documents should be reported to DCA and to the IAB. The RFCs and the MIL-STDs for IP and TCP differ in style and level of detail. It is strongly advised that the two sets of documents be used together, along with RFC-1122.

The IAB and the DoD MIL-STD specifications for the FTP, SMTP, and Telnet protocols are essentially the same documents (RFCs 765, 821, 854). The MIL-STD versions have been edited slightly. Note that the current Internet specification for FTP is RFC-959 (as modified by RFC-1123).

Internet Protocol (IP)	MIL-STD-1777
Transmission Control Protocol (TCP)	MIL-STD-1778
File Transfer Protocol (FTP)	MIL-STD-1780
Simple Mail Transfer Protocol (SMTP)	MIL-STD-1781
Telnet Protocol and Options (TELNET)	MIL-STD-1782

These documents are available from the Naval Publications and Forms Center. Requests can be initiated by telephone, telegraph, or mail; however, it is preferred that private industry use form DD1425, if possible. These five documents are included in the 1985 DDN Protocol Handbook (available from the Network Information Center, see Section 7.4).

Naval Publications and Forms Center, Code 3015
5801 Tabor Ave
Philadelphia, PA 19120
Phone: 1-215-697-3321 (order tape)
1-215-697-4834 (conversation)

4. Explanation of Terms

There are two independent categorization of protocols. The first is the STATE of standardization, one of "standard", "draft standard", "proposed standard", "experimental", "informational" or "historic". The second is the STATUS of this protocol, one of "required", "recommended", "elective", "limited use", or "not recommended".

The status or requirement level is difficult to portray in a one word label. These status labels should be considered only as an indication, and a further description, or applicability statement, should be consulted.

When a protocol is advanced to proposed standard or draft standard, it is labeled with a current status and when possible, the IAB also notes the status that the protocol is expected to have when it reaches the standard state.

At any given time a protocol occupies a cell of the following matrix. Protocols are likely to be in cells in about the following proportions (indicated by the relative number of Xs). A new protocol is most likely to start in the (proposed standard, elective) cell, or the (experimental, not recommended) cell.

		STATUS				
		Req	Rec	Ele	Lim	Not
STATE	Std	X	XXX	XXX		
	Draft	X	X	XXX		
	Prop		X	XXX	X	
	Info		X	XXX	X	X
	Expr			X	XXX	X
	Hist				X	XXX

What is a "system"?

Some protocols are particular to hosts and some to gateways; a few protocols are used in both. The definitions of the terms below will refer to a "system" which is either a host or a gateway (or both). It should be clear from the context of the particular protocol which types of systems are intended.

4.1. Definitions of Protocol State

Every protocol listed in this document is assigned to a STATE of standardization: "standard", "draft standard", "proposed standard", "experimental", or "historic".

4.1.1. Standard Protocol

The IAB has established this as an official standard protocol for the Internet. These are separated into two groups: (1) IP protocol and above, protocols that apply to the whole Internet; and (2) network-specific protocols, generally specifications of how to do IP on particular types of networks.

4.1.2. Draft Standard Protocol

The IAB is actively considering this protocol as a possible Standard Protocol. Substantial and widespread testing and comment are desired. Comments and test results should be submitted to the IAB. There is a possibility that changes will be made in a Draft Standard Protocol before it becomes a Standard Protocol.

4.1.3. Proposed Standard Protocol

These are protocol proposals that may be considered by the IAB for standardization in the future. Implementation and testing by several groups is desirable. Revision of the protocol specification is likely.

4.1.4. Experimental Protocol

A system should not implement an experimental protocol unless it is participating in the experiment and has coordinated its use of the protocol with the developer of the protocol.

Typically, experimental protocols are those that are developed as part of an ongoing research project not related to an operational service offering. While they may be proposed as a service protocol at a later stage, and thus become proposed standard, draft standard, and then standard protocols, the designation of a protocol as experimental may sometimes be meant to suggest that the protocol, although perhaps mature, is not intended for operational use.

4.1.5. Informational Protocol

Protocols developed by other standard organizations, or vendors, or that are for other reasons outside the purview of the IAB, may be published as RFCs for the convenience of the Internet community as informational protocols. Such protocols may in some cases also be recommended for use in the Internet by the IAB.

4.1.6. Historic Protocol

These are protocols that are unlikely to ever become standards in the Internet either because they have been superseded by later developments or due to lack of interest.

4.2. Definitions of Protocol Status

This document lists a STATUS for each protocol. The status is one of "required", "recommended", "elective", "limited use", or "not recommended".

4.2.1. Required Protocol

A system must implement the required protocols.

4.2.2. Recommended Protocol

A system should implement the recommended protocols.

4.2.3. Elective Protocol

A system may or may not implement an elective protocol. The general notion is that if you are going to do something like this, you must do exactly this. There may be several elective protocols in a general area, for example, there are several electronic mail protocols, and several routing protocols.

4.2.4. Limited Use Protocol

These protocols are for use in limited circumstances. This may be because of their experimental state, specialized nature, limited functionality, or historic state.

4.2.5. Not Recommended Protocol

These protocols are not recommended for general use. This may be because of their limited functionality, specialized nature, or experimental or historic state.

5. The Standards Track

This section discusses in more detail the procedures used by the RFC Editor and the IAB in making decisions about the labeling and publishing of protocols as standards.

5.1. The RFC Processing Decision Table

Here is the current decision table for processing submissions by the RFC Editor. The processing depends on who submitted it, and the status they want it to have.

**************	SOURCE			
Desired Status	IAB	IESG	IRSG or RG	Other
Full or Draft Standard	Publish (1)	Vote (3)	Bogus (2)	Bogus (2)
Proposed Standard	Publish (1)	Vote (3)	Refer (4)	Refer (4)
Experimental Protocol	Publish (1)	Notify (5)	Notify (5)	Notify (5)
Information or Opinion Paper	Publish (1)	Discretion (6)	Discretion (6)	Discretion (6)

(1) Publish.

(2) Bogus. Inform the source of the rules. RFCs specifying Standard, or Draft Standard must come from the IAB, only.

(3) Vote by the IAB. If approved then do Publish (1), else do Refer (4).

(4) Refer to an Area Director for review by a WG. Expect to see the document again only after approval by the IESG and the IAB.

(5) Notify both the IESG and IRSG. If no protest in 1 week then do Discretion (6), else do Refer (4).

(6) RFC Editor's discretion. The RFC Editor decides if a review is needed and if so by whom. RFC Editor decides to publish or

not.

Of course, in all cases the RFC Editor can request or make minor changes for style, format, and presentation purposes.

The IESG has designated the IESG Secretary as its agent for forwarding documents with IESG approval and for registering protest in response to notifications (5) to the RFC Editor. Documents from Area Directors or Working Group Chairs may be considered in the same way as documents from "other".

5.2. The Standards Track Diagram

There is a part of the STATUS and STATE categorization that is called the standards track. Actually, only the changes of state are significant to the progression along the standards track, though the status assignments may be changed as well.

The states illustrated by single line boxes are temporary states, those illustrated by double line boxes are long term states. A protocol will normally be expected to remain in a temporary state for several months (minimum four months for proposed standard, minimum six months for draft standard). A protocol may be in a long term state for many years.

A protocol may enter the standards track only on the recommendation of the IESG and by action of the IAB; and may move from one state to another along the track only on the recommendation of the IESG and by action of the IAB. That is, it takes both the IESG and the IAB to either start a protocol on the track or to move it along.

Generally, as the protocol enters the standards track a decision is made as to the eventual STATUS (elective, recommended, or required) the protocol will have, although a somewhat less stringent current status may be assigned, and it then is placed in the the proposed standard STATE with that status. So the initial placement of a protocol is into state 1. At any time the STATUS decision may be revisited.

```
         |
         +<----------------------------------------------+
         |                                               ^
         V    0                                          |    4
   +-----------+                                   +===========+
   |   enter   |-->----------------+-------------->|experiment |
   +-----------+                   |               +=====+=====+
                                   |                     |
                                   V    1                |
                             +-----------+               V
                             | proposed  |-------------->+
                        +--->+-----+-----+               |
                        |          |                     |
                        |          V    2                |
                        +<---+-----+-----+               V
                             | draft std |-------------->+
                        +--->+-----+-----+               |
                        |          |                     |
                        |          V    3                |
                        +<---+=====+=====+               V
                             | standard  |-------------->+
                             +=====+=====+               |
                                                         |
                                                         V    5
                                                   +=====+=====+
                                                   | historic  |
                                                   +===========+
```

The transition from proposed standard (1) to draft standard (2) can only be by action of the IAB on the recommendation of the IESG and only after the protocol has been proposed standard (1) for at least four months.

The transition from draft standard (2) to standard (3) can only be by action of the IAB on the recommendation of the IESG and only after the protocol has been draft standard (2) for at least six months.

Occasionally, the decision may be that the protocol is not ready for standardization and will be assigned to the experimental state (4). This is off the standards track, and the protocol may be resubmitted to enter the standards track after further work. There are other paths into the experimental and historic states that do not involve IAB action.

Sometimes one protocol is replaced by another and thus becomes historic, it may happen that a protocol on the standards track is in a sense overtaken by another protocol (or other events) and becomes historic (state 5).

6. The Protocols

Subsection 6.1 lists recent RFCs and other changes. Subsections 6.2 - 6.8 list the standards in groups by protocol state.

6.1. Recent Changes

6.1.1. New RFCs:

1218 - Naming Scheme for c=US

This is an information document and does not specify any level of standard.

1217 - Memo from the Consortium for Slow Commotion Research (CSCR)

This is an information document and does not specify any level of standard.

1216 - Gigabit Network Economics and Paradigm Shifts

This is an information document and does not specify any level of standard.

1215 - A Convention for Defining Traps for use with the SNMP

This is an information document and does not specify any level of standard.

1214 - OSI Internet Management: Management Information Base

A Proposed Standard protocol.

1213 - Management Information Base for Network Management of TCP/IP-based internets: MIB-II

Advanced to Draft Standard protocol.

1212 - Concise MIB Definitions

This is a new Proposed Standard protocol.

1211 - Problems with the Maintenance of Large Mailing Lists

This is an information document and does not specify any level of standard.

1210 - Network and Infrastructure User Requirements for Transatlantic Research Collaboration - Brussels, July 16-18, and Washington July 24-25, 1990

This is an information document and does not specify any level of standard.

1209 - The Transmission of IP Datagrams over the SMDS Service

This is a new Proposed Standard protocol.

1208 - A Glossary of Networking Terms

This is an information document and does not specify any level of standard.

1207 - FYI on Questions and Answers - Answers to Commonly asked "Experienced Internet User" Questions

This is an information document and does not specify any level of standard.

1206 - FYI on Questions and Answers - Answers to Commonly asked "New Internet User" Questions

This is an information document and does not specify any level of standard.

1205 - 5250 Telnet Interface

This is an information document and does not specify any level of standard.

1204 - Message Posting Protocol (MPP)

This is a new Experimental protocol.

1203 - Interactive Mail Access Protocol - Version 3 (IMAP3)

This is a new Experimental protocol.

1202 - Directory Assistance Service

This is an information document and does not specify any level of standard.

1201 - Transmitting IP Traffic over ARCNET Networks

A Proposed Standard protocol.

1200 - IAB Official Protocol Standards

This memo.

1199 - <not issued yet>

1198 - FYI on the X Window System

This is an information document and does not specify any level of standard.

1197 - Using ODA for Translating Multimedia Information

This is an information document and does not specify any level of standard.

1196 - The Finger User Information Protocol

A Draft Standard protocol. This edition corrects and clarifies in a minor way, RFC 1194.

1195 - Use of OSI IS-IS for Routing in TCP/IP and Dual Environments

A Proposed Standard protocol.

1194 - The Finger User Information Protocol

A Draft Standard protocol.

1193 - Client Requirements for Real-Time Communication Services

This is an information document and does not specify any level of standard.

1192 - Commercialization of the Internet Summary Report

This is an information document and does not specify any level of standard.

1191 - Path MTU Discovery (MTU)

A Proposed Standard protocol.

1190 - Experimental Internet Stream Protocol, Version 2 (ST-II)

A Limited-Use Experimental protocol.

1189 - The Common Management Information Services and Protocols for the Internet

A Proposed Standard protocol.

1188 - A Proposed Standard for the Transmission of IP Datagrams over FDDI Networks

A Draft Standard protocol.

1187 - Bulk Table Retrieval with the SNMP

A new Experimental protocol.

1186 - The MD4 Message Digest Algorithm

A specification of the MD4 Digest Algorithm. This is an information document and does not specify any level of standard.

1185 - TCP Extension for High-Speed Paths

An Experimental protocol extension to TCP.

1184 - Telnet Linemode Option

A Draft Standard protocol.

1183 - New DNS RR Definitions

A new Experimental protocol.

1182 - <not issued yet>

1181 - RIPE Terms of Reference

This is an information document and does not specify any level of standard.

1180 - A TCP/IP Tutorial

This is an information document and does not specify any level of standard.

1179 - Line Printer Daemon Protocol

This is an information document and does not specify any level of standard.

1178 - Choosing a Name for Your Computer

This is an information document and does not specify any level of standard.

1177 - FYI on Questions and Answers - Answers to Commonly asked "New Internet User" Questions

This is an information document and does not specify any level of standard.

1176 - Interactive Mail Access Protocol - Version 2 (IMAP2)

This is a new Experimental protocol.

1175 - FYI on Where to Start - A Bibliography of Internetworking Information

This is an information document and does not specify any level of standard.

1174 - IAB Recommended Policy on Distributing Internet Identifier Assignment and IAB Recommended Policy Change to Internet "Connected" Status

This is an information document and does not specify any level of standard.

1173 - Responsibilities of Host and Network Managers: A Summary of the "Oral Tradition" of the Internet

This is an information document and does not specify any level of standard.

1172 - The Point-to-Point Protocol (PPP) Initial Configuration Options

A Proposed Standard protocol.

1171 - The Point-to-Point Protocol (PPP) for the Transmission of Multi-Protocol Datagrams Over Point-to-Point Links

A Draft Standard protocol.

1170 - Public Key Standards and Licenses

This is an information document and does not specify any level of standard.

1169 - Explaining the Role of GOSIP

This is an information document and does not specify any level of standard.

1168 - Intermail and Commercial Mail Relay Services

This is an information document and does not specify any level of standard.

1167 - Thoughts on the National Research and Education Network

This is an information document and does not specify any level of standard.

1166 - Internet Numbers

This is an information document and does not specify any level of standard.

1165 - Network Time Protocol (NTP) over the OSI Remote Operations Service

An Experimental protocol.

1164 - Application of the Border Gateway Protocol in the Internet

A Proposed Standard protocol.

1163 - A Border Gateway Protocol (BGP)

A Proposed Standard protocol.

1162 - Connectionless Network Protocol (ISO 8473) and End System to Intermediate System (ISO 9542) Management Information Base

This memo does not specify a standard for the Internet community. However, after experimentation, if sufficient consensus is reached in the Internet community, then a subsequent revision of this document...

1161 - SNMP over OSI

An experimental means for running the Simple Network Management Protocol (SNMP) over OSI transports.

1160 - The Internet Activities Board

This is an information document and does not specify any level of standard.

1159 - Message Send Protocol

An Experimental protocol.

6.1.2. Other Changes:

The following are changes to protocols listed in the previous edition.

1213 - Management Information Base for Network Management of TCP/IP-based internets: MIB-II

Advanced to Draft Standard protocol.

1196 - The Finger User Information Protocol

Advanced to Draft Standard protocol.

1191 - Path MTU Discovery

Advanced to Proposed Standard protocol.

1189 - The Common Management Information Services and Protocols for the Internet

Moved to Proposed Standard protocol.

1188 - A Proposed Standard for the Transmission of IP Datagrams over FDDI Networks

Advanced to Draft Standard protocol.

1184 - Telnet Linemode Option

Advanced to Draft Standard protocol.

1171 - The Point-to-Point Protocol for the Transmission of Multi-Protocol Datagrams Over Point-to-Point Links

Advanced to Draft Standard protocol.

1163 - A Border Gateway Protocol (BGP)

Advanced to Proposed Standard protocol.

6.2. Standard Protocols

Protocol	Name	Status	RFC
--------	Assigned Numbers	Required	1060
--------	Gateway Requirements	Required	1009
--------	Host Requirements - Communications	Required	1122
--------	Host Requirements - Applications	Required	1123
IP	Internet Protocol	Required	791
	as amended by:		
--------	IP Subnet Extension	Required	950
--------	IP Broadcast Datagrams	Required	919
--------	IP Broadcast Datagrams with Subnets	Required	922
ICMP	Internet Control Message Protocol	Required	792
IGMP	Internet Group Multicast Protocol	Recommended	1112
UDP	User Datagram Protocol	Recommended	768
TCP	Transmission Control Protocol	Recommended	793
SMI	Structure of Management Information	Recommended	1155
MIB	Management Information Base	Recommended	1156
SNMP	Simple Network Management Protocol	Recommended	1157
DOMAIN	Domain Name System	Recommended	1034,1035
TELNET	Telnet Protocol	Recommended	854
FTP	File Transfer Protocol	Recommended	959
SMTP	Simple Mail Transfer Protocol	Recommended	821
MAIL	Format of Electronic Mail Messages	Recommended	822
CONTENT	Content Type Header Field	Recommended	1049
EGP	Exterior Gateway Protocol	Recommended	904
ECHO	Echo Protocol	Recommended	862
NTP	Network Time Protocol	Recommended	1119
NETBIOS	NetBIOS Service Protocols	Elective	1001,1002
DISCARD	Discard Protocol	Elective	863
CHARGEN	Character Generator Protocol	Elective	864
QUOTE	Quote of the Day Protocol	Elective	865
USERS	Active Users Protocol	Elective	866
DAYTIME	Daytime Protocol	Elective	867
TIME	Time Server Protocol	Elective	868

Notes:

IGMP -- The Internet Activities Board intends to move towards general adoption of IP multicasting, as a more efficient solution than broadcasting for many applications. The host interface has been standardized in RFC-1112; however, multicast-routing gateways are in the experimental stage and are not widely available. An Internet host should support all of RFC-1112, except for the IGMP protocol itself which is optional; see RFC-1122 for more details. Even without IGMP, implementation of RFC-1112 will provide an important advance: IP-layer access to local network multicast addressing. It is expected that IGMP will become recommended for all hosts and gateways at some future date.

SMI, MIB, SNMP -- The Internet Activities Board recommends that all IP and TCP implementations be network manageable. At the current time, this implies implementation of the Internet MIB (RFC-1156), the MIB extension MIB-II (RFC-1158, a Draft Standard), and at least the recommended management protocol SNMP (RFC-1157).

6.3. Network-Specific Standard Protocols

Protocol	Name	Status	RFC
ARP	Address Resolution Protocol	Elective	826
RARP	A Reverse Address Resolution Protocol	Elective	903
IP-ARPA	Internet Protocol on ARPANET	Elective	BBN 1822
IP-WB	Internet Protocol on Wideband Network	Elective	907
IP-X25	Internet Protocol on X.25 Networks	Elective	877
IP-E	Internet Protocol on Ethernet Networks	Elective	894
IP-EE	Internet Protocol on Exp. Ethernet Nets	Elective	895
IP-IEEE	Internet Protocol on IEEE 802	Elective	1042
IP-DC	Internet Protocol on DC Networks	Elective	891
IP-HC	Internet Protocol on Hyperchannel	Elective	1044
IP-ARC	Internet Protocol on ARCNET	Elective	1051
IP-SLIP	Transmission of IP over Serial Lines	Elective	1055
IP-NETBIOS	Transmission of IP over NETBIOS	Elective	1088
IP-FDDI	Transmission of IP over FDDI	Elective	1103
IP-IPX	Transmission of 802.2 over IPX Networks	Elective	1132

Notes:

It is expected that a system will support one or more physical networks and for each physical network supported the appropriate protocols from the above list must be supported. That is, it is elective to support any particular type of physical network, and for the physical networks actually supported it is required that they be supported exactly according to the protocols in the above list. See also the Host and Gateway Requirements RFCs for more specific information on network-specific ("link layer") protocols.

6.4. Draft Standard Protocols

Protocol	Name	Status	RFC
FINGER	Finger Protocol	Elective	1196*
IP-FDDI	Internet Protocol on FDDI Networks	Elective	1188*
TOPT-LINE	Telnet Linemode Option	Elective	1184*
MIB-II	MIB-II	Elective	1213*
PPP	Point to Point Protocol	Elective	1171*
--------	Mail Privacy: Procedures	Elective	1113
--------	Mail Privacy: Key Management	Elective	1114
--------	Mail Privacy: Algorithms	Elective	1115
BOOTP	Bootstrap Protocol	Recommended	951,1048,1084
RIP	Routing Information Protocol	Elective	1058
TP-TCP	ISO Transport Service on top of the TCP	Elective	1006
NICNAME	WhoIs Protocol	Elective	954
TFTP	Trivial File Transfer Protocol	Elective	783

Notes:

RIP -- The Routing Information Protocol (RIP) is widely implemented and used in the Internet. However, both implementors and users should be aware that RIP has some serious technical limitations as a routing protocol. The IETF is currently developing several candidates for a new standard "open" routing protocol with better properties than RIP. The IAB urges the Internet community to track these developments, and to implement the new protocol when it is standardized; improved Internet service will result for many users.

TP-TCP -- As OSI protocols become more widely implemented and used, there will be an increasing need to support interoperation with the TCP/IP protocols. The Internet Engineering Task Force is formulating strategies for interoperation. RFC-1006 provides one interoperation mode, in which TCP/IP is used to emulate TP0 in order to support OSI applications. Hosts that wish to run OSI connection-oriented applications in this mode should use the procedure described in RFC-1006. In the future, the IAB expects that a major portion of the Internet will support both TCP/IP and OSI (inter-)network protocols in parallel, and it will then be possible to run OSI applications across the Internet using full OSI protocol "stacks".

MIB-II -- This memo defines a mandatory extension to the base MIB (RFC-1156) and is a Draft Standard for the Internet community. The extensions described here are currently Elective, but when they become a standard, they will have the same status as RFC-1156, that is, Recommended. See also the note on SMI, MIB and SNMP under Standards.

PPP -- Point to Point Protocol is a method of sending IP over serial lines, which are a type of physical network. It is anticipated that PPP will be advanced to the network-specific standard protocol state in the future.

6.5. Proposed Standard Protocols

Protocol	Name	Status	RFC
OIM-MIB-II	OSI Internet Management: MIB-II	Elective	1214*
Concise-MIB	Concise MIB Definitions	Elective	1212*
IP-SMDS	IP Datagrams over the SMDS Service	Elective	1209*
IP-ARCNET	Transmitting IP Traffic over ARCNET Networks	Elective	1201*
IS-IS	Use of OSI IS-IS for Routing in TCP/IP and Dual Environments	Elective	1195*
IP-MTU	Path MTU Discovery	Elective	1191*
CMOT	Common Management Information Services and Protocol over TCP/IP	Elective	1189*
PPP-INIT	PPP Initial Configuration Options	Elective	1172*
BGP	Border Gateway Protocol	Elective	1163,1164*
IP-CMPRS	Compressing TCP/IP Headers	Elective	1144
--------	Echo for ISO-8473	Elective	1139
OSPF	Open Shortest Path First Routing	Elective	1131
TOPT-ENV	Telnet Environment Option	Elective	1116*
SUN-NFS	Network File System Protocol	Elective	1094
POP3	Post Office Protocol, Version 3	Elective	1081,1082
SUN-RPC	Remote Procedure Call Protocol	Elective	1057
PCMAIL	Pcmail Transport Protocol	Elective	1056
NFILE	A File Access Protocol	Elective	1037
--------	Mapping between X.400(84) and RFC-822	Elective	987,1026
NNTP	Network News Transfer Protocol	Elective	977
HOSTNAME	HOSTNAME Protocol	Elective	953
SFTP	Simple File Transfer Protocol	Elective	913
RLP	Resource Location Protocol	Elective	887
SUPDUP	SUPDUP Protocol	Elective	734

Notes:

IP-SMDS and IP-ARCNET -- These define methods of sending IP over particular network types. It is anticipated that these will be advanced to the network specific standard protocol state in the future.

6.6. Experimental Protocols

Protocol	Name	Status	RFC
MPP	Message Posting Protocol	Limited Use	1204*
ST-II	Stream Protocol	Limited Use	1190*
SNMP-BULK	Bulk Table Retrieval with the SNMP	Limited Use	1187*
DNS-RR	New DNS RR Definitions	Limited Use	1183*
NTP-OSI	NTP over OSI Remote Operations	Limited Use	1165*
MSP	Message Send Protocol	Limited Use	1159*
EHF-MAIL	Encoding Header Field for Mail	Elective	1154
DMF-MAIL	Digest Message Format for Mail	Elective	1153
RDP	Reliable Data Protocol	Limited Use	908,1151
--------	Mapping between X.400(88) and RFC-822	Elective	1148
TCP-ACO	TCP Alternate Checksum Option	Not Recommended	1146
--------	Mapping full 822 to Restricted 822	Elective	1137
IP-DVMRP	IP Distance Vector Multicast Routing	Not Recommended	1075
TCP-LDP	TCP Extensions for Long Delay Paths	Limited Use	1072
IMAP2	Interactive Mail Access Protocol	Limited Use	1176,1064
IMAP3	Interactive Mail Access Protocol	Limited Use	1203*
VMTP	Versatile Message Transaction Protocol	Elective	1045
COOKIE-JAR	Authentication Scheme	Not Recommended	1004
NETBLT	Bulk Data Transfer Protocol	Not Recommended	998
IRTP	Internet Reliable Transaction Protocol	Not Recommended	938
AUTH	Authentication Service	Not Recommended	931
LDP	Loader Debugger Protocol	Not Recommended	909
NVP-II	Network Voice Protocol	Limited Use	ISI-memo
PVP	Packet Video Protocol	Limited Use	ISI-memo

6.7. Informational Protocols

Protocol	Name	RFC
SNMP-TRAPS	A Convention for Defining Traps for use with SNMP	1215*
DAS	Directory Assistance Service	1202*
-------	FYI on the X Window System	1198*
ODA	Office Document Architecture	1197*
MD4	MD4 Message Digest Algorithm	1186*
LPDP	Line Printer Daemon Protocol	1179*

6.8. Historic Protocols

Protocol	Name	Status	RFC
SGMP	Simple Gateway Monitoring Protocol	Not Recommended	1028
HEMS	High Level Entity Management Protocol	Not Recommended	1021
STATSRV	Statistics Server	Not Recommended	996
POP2	Post Office Protocol, Version 2	Not Recommended	937
RATP	Reliable Asynchronous Transfer Protocol	Not Recommended	916
THINWIRE	Thinwire Protocol	Not Recommended	914
HMP	Host Monitoring Protocol	Not Recommended	869
GGP	Gateway Gateway Protocol	Not Recommended	823
RTELNET	Remote Telnet Service	Not Recommended	818
CLOCK	DCNET Time Server Protocol	Not Recommended	778
MPM	Internet Message Protocol	Not Recommended	759
NETRJS	Remote Job Service	Not Recommended	740
NETED	Network Standard Text Editor	Not Recommended	569
RJE	Remote Job Entry	Not Recommended	407
XNET	Cross Net Debugger	Not Recommended	IEN-158
NAMESERVER	Host Name Server Protocol	Not Recommended	IEN-116
MUX	Multiplexing Protocol	Not Recommended	IEN-90
GRAPHICS	Graphics Protocol	Not Recommended	NIC-24308

7. Contacts

7.1. IAB, IETF, and IRTF Contacts

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The protocol standards are managed for the IAB by the Internet Assigned Numbers Authority.

Please refer to the documents "Assigned Numbers" (RFC-1060) and "Official Internet Protocols" (RFC-1011) for further information about the status of protocol documents. There are two documents that summarize the requirements for host and gateways in the Internet, "Host Requirements" (RFC-1122 and RFC-1123) and "Gateway Requirements" (RFC-1009).

How to obtain the most recent edition of this "IAB Official Protocol Standards" memo:

The file "in-notes/iab-standards.txt" may be copied via FTP from the VENERA.ISI.EDU computer using the FTP username "anonymous" and FTP password "guest".

7.3. Request for Comments Editor Contact

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Documents may be submitted via electronic mail to the RFC Editor for consideration for publication as RFC. If you are not familiar with the format or style requirements please request the "Instructions for RFC Authors". In general, the style of any recent RFC may be used as a guide.

7.4. The Network Information Center and Requests for Comments Distribution Contact

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The Network Information Center (NIC) provides many information services for the Internet community. Among them is maintaining the Requests for Comments (RFC) library.

RFCs can be obtained via FTP from NIC.DDN.MIL, with the pathname RFC:RFCnnnn.TXT where "nnnn" refers to the number of the RFC. A list of all RFCs may be obtained by copying the file RFC:RFC-INDEX.TXT. Log in with FTP username ANONYMOUS and password GUEST.

The NIC also provides an automatic mail service for those sites which cannot use FTP. Address the request to SERVICE@NIC.DDN.MIL and in the subject field of the message indicate the file name, as in "Subject: SEND RFC:RFCnnnn.TXT".

Some RFCs are now available in PostScript, these may be obtained from the NIC in a similar fashion by substituting ".PS" for ".TXT".

How to obtain the most recent edition of this "IAB Official Protocol Standards" memo:

The file RFC:IAB-STANDARDS.TXT may be copied via FTP from the NIC.DDN.MIL computer following the same procedures used to obtain RFCs.

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8. Security Considerations

Security issues are not addressed in this memo.

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